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Assignee: TOTO Co., Ltd.



Specification

1. Title of the Invention Kitchen Waste Disposal System

[ABSTRACT]

[Object] It is an object to provide a kitchen-waste disposal system capable of completely flushing away a ground kitchen waste through a piping to fully bring out its original functions.

[Structure] A kitchen-waste disposal system comprises kitchen-waste grinding means including a grinding speed variable mechanism, wherein kitchen-waste information such as the amount of a kitchen waste to be treated and/or the level of easiness in grinding the kitchen waste, and/or a disposal state such as an actual grinding speed is detected to variably control the grinding speed of the kitchen waste.

[Claims]

1. A kitchen-waste disposal system comprising:
 - kitchen-waste grinding means for grinding an organic waste such as a kitchen waste;
 - a piping for transferring a ground kitchen waste ground by said kitchen-waste grinding means;
 - transfer-medium supply means for supplying a transfer medium for allowing said ground kitchen waste to be transferred through said piping;
 - control means for controlling the operation of said kitchen-waste grinding means and/or said transfer medium supply means; and
 - instruction means for instructing the start and/or stop of the kitchen-waste disposal operation to said control means, wherein
 - said kitchen-waste grinding means includes a mechanism for variably controlling a grinding speed of the kitchen waste.
2. A kitchen-waste disposal system as defined in claim 1, wherein said kitchen-waste grinding means includes detection means for detecting kitchen-waste information such as the amount of a kitchen waste to be treated and/or the level of easiness in grinding the kitchen waste, and/or a disposal state such as an actual grinding speed, wherein said control means is operable to variably control the grinding speed of the kitchen waste according to the information from said detect means.
3. A kitchen-waste disposal system as defined in claim 1 or 2, wherein said control means is operable to controllably reduce the grinding speed in an initial stage of the kitchen-waste disposal operation.
4. A kitchen-waste disposal system as defined in either one of claims 1 to 3, wherein said control means includes setting adjustment means for variably adjusting a setting value of the grinding speed of said kitchen-waste grinding means and/or an operation condition of said transfer-medium supply means, in conformity with design information of the piping in fluid communication with said kitchen-waste grinding means.
5. A kitchen-waste disposal system as defined in claim 4, wherein said setting adjustment means of said control means is adjustable to reduce the grinding speed of said kitchen-waste grinding means in a negative correlation with the length of vertical pipe of said piping in fluid communication with said kitchen-waste grinding means.
6. A kitchen-waste disposal system as defined in either one of claims 1 to 5, wherein said control means is operative to control a supply speed of said transfer medium in a positive correlation with the grinding speed of the kitchen waste detected by said detect means.

3. Detailed Description of the Invention

[Field of the Invention]

The present invention relates to a kitchen-waste disposal system for disposing an organic waste such as a kitchen waste produced in business offices or households.

[Prior Art]

An organic waste such as a kitchen waste causes a pathogenic foul smell or liquid and impairs a hygienic environment in living or working space. A kitchen-waste disposal system using a disposer, disclosed in Japanese Patent Laid-Open Publication Nos. 03-89954, 04-305284 and 10-180236, is a significantly effective system to improve the hygienic environment in kitchen or working space because it can extemporarily dispose an organic waste at home kitchens or business offices.

[Problems to be solved by the Invention]

For achieving an effective use of such a system, it is required to adequately control conditions for supplying a transfer medium so as to completely flush away a kitchen waste ground by a disposer serving as kitchen-waste grinding means. However, any effective method or apparatus for supplying the transfer medium has not been proposed. Particularly in a housing complex, collectivizing is promoted to reduce energy and materials for constructing a building, and thereby the scale of collectivizing and the number of high-rise buildings is increasing. The collectivizing of houses leads to an increased number of kitchen-waste grinding equipment such as disposers in fluid communication with a common piping, resulting in clogging of the piping.

In view of this problem, it is therefore an object of the present invention to provide a kitchen-waste disposal system capable of completely flushing away a ground kitchen waste through a piping to fully bring out its original functions.

[Means for solving Problem]

In order to achieve the above object, a kitchen-waste disposal system according to the present invention is constructed to supply a transfer medium directly to or through kitchen-waste grinding means a piping for transferring a ground kitchen waste on an adequate condition so as to prevent the ground kitchen waste from depositing in the piping. The transfer medium to be supplied may be clean water, reuse water, rainwater or treated water prepared by purifying the water used in the transfer. In order to economize in water consumption, it is effective to intermittently supply water, use a two-phase or gas-liquid flow prepared by mixing gas into a supply fluid, or alternately supply water and gas. Considering that flowability of the ground kitchen waste in the piping is significantly deteriorated due to contamination in the piping caused by oil-containing wastewater discharged from a sink of a house, it is also effective to supply a heated water or add a conditioner including a cleaning agent such as alkali or enzyme to clean the contamination in the piping.

In order to transfer the ground kitchen waste through the piping in the kitchen-waste disposal system, it is required to discharge the ground kitchen waste in the form of low concentration slurry by sufficiently dispersing the ground kitchen waste in the transfer medium. However, in the conventional kitchen-waste grinding means wherein a kitchen waste is thrown thereinto in advance and then a grinding operation is started, the ground kitchen waste is massively produced in an initial stage of the grinding operation to form extremely high concentration slurry, and thereby the flowability in the piping is deteriorated. From this point of view, in the present invention, the grinding speed is reduced in the initial stage of the grinding operation to prevent formation of the high concentration slurry. When a motor is used to grind a kitchen waste, the grinding speed can be controlled by the

speed of the motor. These relate to claims 1 and 3.

Further, the suitable grinding speed of a kitchen waste differs depending on the amount of a kitchen waste to be treated and/or the level of easiness in grinding the kitchen waste. Thus, the present invention provides detect means for detecting kitchen-waste information such as the amount of a kitchen waste to be disposed and/or the level of easiness in grinding the kitchen waste, and/or detect means for detecting an actual grinding speed, to variably control the grinding speed of the kitchen waste according to the information from the detect means so as to prevent the formation of the high concentration slurry. When a motor is used to grind a kitchen waste, the kitchen waste information can be obtained by detecting electric power supplied to the motor, electric power consumption, torque or the like. The actual grinding speed of the kitchen waste can be obtained from information about temporal change of the amount of kitchen waste. The supply speed of the transfer medium is controlled in response with the actual grinding speed of the kitchen waste to prevent the formation of the high concentration slurry or to prevent excessively diluted slurry leading to increased energy consumption. These relate to claims 2 and 6.

In a vertical pipe of the piping in fluid communication with the kitchen-waste grinding means, the slurry of the ground kitchen waste and the transfer medium tends to be divided into solid and liquid matters, and this tendency comes to the front as the length of the vertical pipe is increased. Because the liquid matter flows in contact with the wall of the pipe, while the solid matter falls down in the pipe. The separation of the solid and liquid matters leads to clogging at a horizontal following the vertical pipe. From this point of view, when the kitchen-waste grinding means is installed, a setting value of based on the kitchen-waste grinding means, particularly the grinding speed in the initial stage of the grinding operation, is variably adjusted based on design information about the length, material, diameter and associated coupling structure of the vertical pipe in fluid communication with the kitchen-waste grinding means, the diameter and inclination of the horizontal pipe following the vertical pipe, and others, so as to maintain low concentration of the ground kitchen-waste slurry discharged from the kitchen-waste grinding means installed in an upper story of a high-rise building and prevent the clogging of the piping due to the separation of the solid and liquid matters in the vertical pipe. These relate to claims 4 and 5.

[Embodiment of the Invention]

An organic waste such as a kitchen waste is ground by kitchen-waste grinding means such as a disposer. Then, the ground kitchen waste is transferred through a piping with water to a waste disposal facility by each household, each urban area, each housing complex, or each industrial plant, and purified at the waste disposal facility. Alternatively, the ground kitchen waste is purified at a sewage treatment facility together with domestic wasted water. In households, the disposal of the organic waste is performed by kitchen-waste grinding means such as a disposer installed at a kitchen, and the waste can be treated as needed. Thus, it is unnecessary to store the organic waste such as a kitchen waste in a house until the day of garbage collection by administrative agency, and thereby the hygienic environment in living or working space is improved. Further, since the organic waste is treated independently, other dry waste can be sanitarily and easily stored in a house without any need for constructing the storage in a sealed structure in consideration of rottenness of the organic waste. The system of the present invention can significantly

improve an operation performance in a recycling process for collecting dry wastes other than the organic waste and sorting them to recycle.

In order to bring out ecological effects of this disposal system, it is required to reliably transfer the kitchen waste ground by kitchen-waste grinding means such as a disposer to a subsequent step. The present invention provides a reliable kitchen-waste transfer system in piping, which is a key factor for achieve the disposal system.

(Embodiment)

For the purpose of easy understanding of the present invention, an embodiment of the present invention will now be described with reference to the drawing.

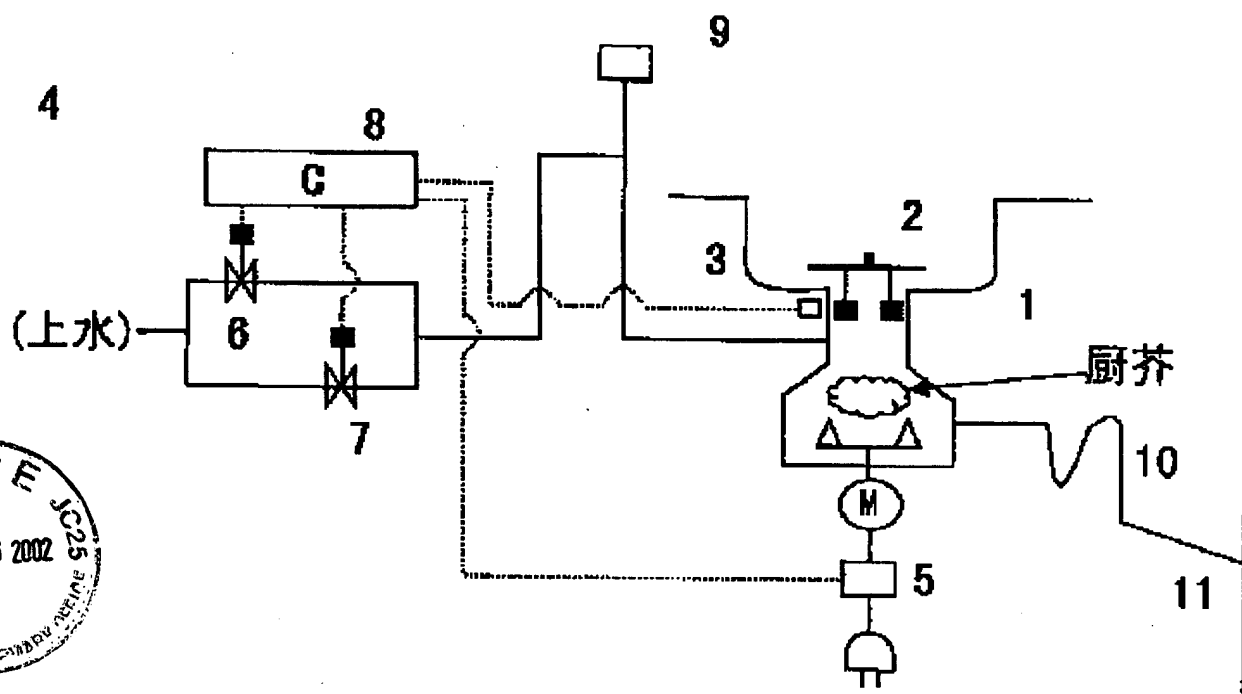
Fig. 1 shows one embodiment of the present invention. A kitchen-waste grinding operation is performed by a disposer 1 installed in a kitchen sink. An openable safety lid 2 is provided at the inlet of the dispose. In the disposer, a device for holding an inoperative state of the disposer unless a sensor for detecting the open/close state of the safety lid generates a lid-open signal also serves as a switch mechanism for generating instructions of actuating and stopping the disposer. Clean water is used as the transfer medium, and is automatically supplied in response to the activation of the disposer.

Fig. 2 shows an example of the control of the kitchen-waste disposal system according to the present invention. In this embodiment, after a kitchen waste is thrown into the disposal in advance, the safety lid is closed to start the grinding operation. In this embodiment, the grinding speed of the disposer is controlled by the speed of a motor, and the amount of water to be supplied is controlled by a pair of switching valves. In these controls, the activation signal of the switch mechanism is used as a trigger, and each operation is determined by a timer in a controller. The motor speed is increased in incremental steps. In the initial stage, the both switching valves are opened to supply a large amount of water so as to prevent the concentration of solid matter in the discharged slurry from being increased. After the motor is stopped, a large amount of water is supplied again to flush away the remaining ground kitchen waste in a trap. Then, the valves are intermittently opened to supply water less than that in a case where one of the valves is continuously opened so as to assure economizing in water consumption. In the final stage, one on the valves is intermittently opened again to supply water serving as sealing water for the trap 10. For simplifying the apparatus, the disposer is stopped by a timer signal from the control unit. The initial stage of the grinding operation in which the kitchen-waste grinding means is controlled in a low grinding speed is a time required for grinding less than one-half of the kitchen waste thrown into the kitchen-waste grinding means and discharging it therefrom.

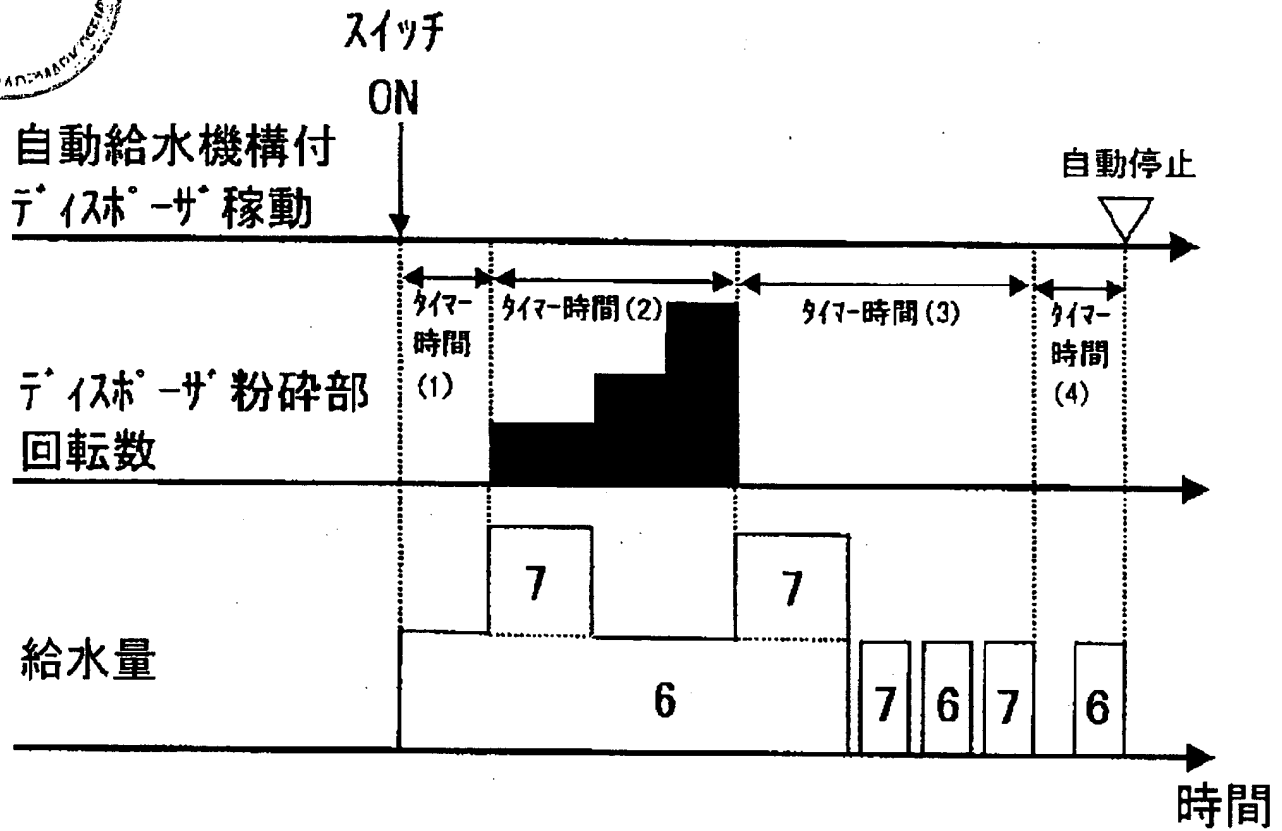
[Effect of the Invention]

A disposer system for home or business purpose is given the status of one of social infrastructures for a next-generation separated refuse correction. An organic waste such as a kitchen waste is treated by kitchen-waste grinding means such as a disposer installed at a place where the waste is produced, so as to prevent the organic waste from being mixed with other waste to facilitate treating by other system or recycling. For this purpose, while it is required to reliably transfer the kitchen waste ground by the kitchen-waste grinding means such as a disposer to a subsequent step, any effective method has not been found out. The present invention provides the reliable transfer system to allow the

6



PICTURE 1



PICTURE 2